Lat 39.46147 Lon -121.10096

United States Department of Agriculture | **Forest Service** | Northern California Shared Service Area | **2400 Washington Ave. Redding, CA 96001 530-242-2336**

File Code: 3400 **Date:** October 16, 2000
Route To:
Subject: Assessment Of Ponderosa Pine Failure At Pendola Fire (FPM Rept. 01-01)
To: Wayne Crowder, LEO
Plumas National Forest

On September 13, 2000, Pete Angwin (Plant Pathologist, Forest Pest Management) and Dave Schultz (Entomologist, Forest Pest Management) accompanied Wayne Crowder to the site where a ponderosa pine fell into a power line. This started the Pendola Fire, which burned an area of approximately 11,000 acres. While at the site, we inspected the fallen pine, assessed the amount of decay that was present when the tree fell, took measurements of the tree and distance to the power line, took pictures, and assessed the general condition of the trees in the area.

Before the pine fell, it was alive and approximately 170-feet tall. At its closest point, the tree was 100 feet from the power line, but it fell at an angle, hitting the line at a distance of approximately 150-feet. Although the break occurred approximately 25 feet up the bole, it sheared off along a vertical stress crack to a point 10 feet up the bole. The crack itself ran down to 3 feet above the ground. At the time of our inspection, the broken tree had been cut so that seven pieces were present (see attached diagram): the 3.85-foot-tall stump (photographs 1-4), an approximately 20-foot-long bole piece below the break (photographs 5-9), an approximately 4-foot long piece that connected the lower bole to the site of the break (photograph 10), an approximately 4-foot long piece that connected the site of the break to the upper stem of the tree (photograph 11), the upper stem (photographs 12-13), and two pieces that came from where the tree sheared out.

Although the tree was scorched in the subsequent fire, enough remained to get a clear idea of what it looked like before the fire. A 1.4-foot tall hollow, evidence of an old fire scar, was present in the stump at ground level. A larger, more recent “cat face” scar was present above and surrounding the older fire scar, extending to the top of the 3.85-foot tall cut stump (photographs 3 and 4). It is difficult to tell if fire or mechanical wounding was the cause of the cat face. However, barbed wire was found imbedded in the bark and indicated that the base of the tree was subject to considerable mechanical wounding. Decayed wood was readily taken from the surface of the fire scar and from the cat face. Inspection of the cut surface of the bole piece where it attached to the stump revealed extensive decay (photographs 5, 6 and 7), which in places extended nearly to the center of the tree. The vertical stress crack that extended up the tree was also readily seen in the cut face and on the back side of the bole piece (photograph 8). We took samples of the decay from the stump and bole pieces at every foot until the decay column ran out. Visible decay was extensive at 8-feet above the ground line (photograph 9), and continued to be extensive to the 13-foot level. Tunnels of roundheaded and flatheaded borers, which indicate dead wood under the bark, were noted at 5 and 9-feet up the tree. Noticibly more solid wood was present between 13 and 14-feet up, and visible decay ended between 14 and 15-feet up.

Although much of the decay was inside the tree and not readily visible, a number of indicators were present outside the tree to indicate the problem within. The old fire scar, the more recent cat

face, and the hollow with extensive decay all indicated the presence of an internal decay column which had ample time to extend well into the tree. Sampling various points of the tree with an increment borer would have shown the extent of the decay. Hitting the tree with the butt-end of an axe would have produced a hollow, drum-like sound, indicating decay within. The large stress crack running up base of the tree would also have indicated structural problems within. All of these indicators could have been spotted by a reasonably well trained tree inspector.

We walked about 100 yards north and south of the tree failure along the power line to observe the pattern of hazard tree abatement. There was abundant evidence of tree pruning, but little evidence of hazard tree removal (photograph 14). Additional evidence of potential problems was seen on inspecting the surrounding stand. Many trees had broken tops, indicating frequent high winds and the likelihood of decay below the breaks (photograph 15). A number of trees were also bent in the direction of the wind. This condition, called "wind sweep", indicates the presence of frequent high winds during the development of a tree.

Additional defective, hazardous standing trees were also found within falling distance of the power line. In particular, a large ponderosa pine was found about 40 yards south along the fence line. This tree looked similar to what the fallen tree must have looked like prior to its failure (photographs 16 and 17). Like the failed tree, the pine had a large cat face at the base with extensive associated decay (photograph 18). In addition, the tree had a large butt canker (caused by either a dwarf mistletoe or gall rust infection). Both indicate decay or the potential of decay within. Red turpentine beetle pitch tubes and the fruiting bodies of the gray saprot fungus, *Cryptoporus volvatus* are currently present (photograph 19), but probably are a result of the cambium being injured or killed by the fire. This extremely defective tree was 178-feet tall, but was 147-feet from the nearest power pole (and closer to the nearest power line).

In conclusion, it is apparent to us that the conditions that led to the failure of the ponderosa pine that struck the power line and started the Pendola Fire could have been spotted before the failure took place.

If you have any further questions regarding the observations in this report, feel free to contact either of us. Pete Angwin may be reached at (530) 242-2336 and Dave Schultz may be reached at (530) 242-2335.

/s/ Pete Angwin
Plant Pathologist
Forest Pest Management

/s/ Dave Schultz
Entomologist
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Enclosures: 1 diagram, photograph descriptions, 19 photographs

PHOTOGRAPHS

1. Stump and bole piece of fallen ponderosa pine.
2. Stump and bole piece of fallen ponderosa pine
3. Stump of fallen ponderosa pine. Note “cat face” scar, fire scar and hollow, and barbed wire embedded in the stump.
4. Close up view of stump.
5. Bole piece of fallen ponderosa pine. Note decay at cut surface and along the interior of the piece. Also note stress crack on left side of decay.
6. Cut surface of bole piece of fallen ponderosa pine. Note decay and crack.
7. Close up of cut surfae of bole piece. Note decay almost to the center of the tree, crack at left associated with decay.
8. Crack in back side of bole piece.
9. Decayed wood from bole piece, 8-feet above the ground.
10. Lower break piece of ponderosa pine (attached to the bole piece).
11. Upper break piece of ponderosa pine (attached to the upper stem).
12. Upper main stem of fallen ponderosa pine.
13. Upper main stem of fallen ponderoas pine.
14. Tree trimming near power line.
15. View of trees in stand. Note broken tree tops. Top of tree in center was broken twice and a new leader took over.
16. View south down the power line toward the fallen tree and defective standing ponderosa pine.
17. View south down the power line toward the fallen tree and defective standing ponderosa pine.
18. Base of highly defective standing ponderosa pine about 40-yards south of fallen pine. Note large cat face scar and butt canker with associate decay.
19. Red turpentine beetle pitch tubes (circled in blue) on base of the defective standing pine.